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10/765,647	01/26/2004	Laura Wills Mirkarimi	10030753-1	1183

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AGILENT TECHNOLOGIES, INC.  
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Intellectual Property Administration  
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Loveland, CO 80537-0599

EXAMINER
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DEO, DUY VU NGUYEN

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1792

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/765,647  
Filing Date: January 26, 2004  
Appellant(s): MIRKARIMI, LAURA WILLS

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James C. Pintner  
For Appellants

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 6/16/08 appealing from the Office action mailed 5/14/08.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

No amendment after final has been filed.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

5,338,394

Fathimulla et al.

8-1994

S. J. Pearton et al. "High-rate, anisotropic dry etching of InP in HI-based discharges"

Appl. Phys. Lett. 60(7) (Feb. 17, 1992), pp 838-840

**(9) Grounds of Rejection**

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The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fathimulla et al. (US 5,338,394) and further in view of Pearton et al. (Appl. Phys. Lett. 60 (7)).

Referring to claims 1, 2, 12, 13, Fathimulla describes a method for etching an III-V material comprising: placing the III-V substrate into a RIE chamber and etching the substrate with a gas mixture of HBr and CH<sub>4</sub> (claims 1-4). Unlike claimed invention, Fathimulla doesn't describe the gas mixture having H<sub>2</sub>. Pearton teaches a method for etching III-V material wherein the gas mixture includes H<sub>2</sub> (pages 839; left column). It would have been obvious for one skilled in the art at the time of the invention to modify Fathimulla in light of Pearton by including H<sub>2</sub> in the gas mixture because Pearton teaches addition of the H<sub>2</sub> to the gas mixture provide a much smoother surfaces and Fathimulla teaches that other combinations of gas composition can be used to give a smooth vertical feature (col. 3, line 65-68).

Referring to claims 6, 17, Fathimulla describes the P is about 1-5 mtorr (claim 9). Referring to claims 7, 18, Pearton further describes the dc bias is 100 V (fig. 2). Referring to claims 8, 19, with the via hole depth of 100 urn, as taught by Fathimulla, this would create a vertical feature having an aspect ratio of greater than ten (col. 2, line 36-37). Referring to claims 9-11, 20 Fathimulla describes a SiN mask (col. 2, line 30-33).

Referring to claims 3-5, 14-16, applied prior art doesn't describe the percentages of the first, second, and third gas. However, the gas percentage is a result-effective

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variable as discussed by Pearton, where flow rates (gas percentage) of gases are experimented to achieve different etch rates (page 839; left column). Therefore, one skilled in the art would find it obvious to determine each gas percentage through routine experimentation in order to provide optimum gas flow rates or percentages to etch the substrate with a reasonable expectation of success.

#### **(10) Response to Argument**

None of appellants' arguments have addressed or traversed the motivation, (for adding H<sub>2</sub> from Pearton's teaching into Fathimulla's composition of CH<sub>4</sub> and HBr) that Pearton teaches addition of the H<sub>2</sub> to the gas mixture provide a much smoother surfaces and Fathimulla teaches that other combinations of gas composition can be used to give a smooth vertical feature (col. 3, line 65-68).

Appellants' argument that Fathimulla doesn't teach using gas comprising CH<sub>4</sub> and H<sub>2</sub> is acknowledged. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Appellant's argument that Fathimulla teaches away of using CH<sub>4</sub> and H<sub>2</sub> because they are recited by Fathimulla in the alternative is found unpersuasive because this is not teaching away but it just teaches a way of etching. There is no specific teaching from Fathimulla that CH<sub>4</sub> and H<sub>2</sub> can't be used together. Furthermore, teaching of replacing a mixture of CH<sub>4</sub>/H<sub>2</sub>/Ar with another gas mixture at certain

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processing parameters doesn't necessarily mean that the components of CH<sub>4</sub>/H<sub>2</sub>/Ar can't be used together. In fact, Pearton shows that at the time of the invention was made, H<sub>2</sub> is compatible with CH<sub>4</sub> for etching III-V materials and adding H<sub>2</sub> would provide a smooth etching or surface (page 838, col. 1, 1<sup>st</sup> and 2<sup>nd</sup> paragraphs). As suggested by Pearton, the smooth surface is achieved by the addition of the H<sub>2</sub> (page 839, 1<sup>st</sup> column, 2<sup>nd</sup> paragraph) and Fathimulla teaches that other combinations of gas composition can be used to give a smooth vertical feature (col. 3, line 65-68). Fathimulla also shows that H<sub>2</sub> is compatible with HBr (col. 2, line 10-18). Therefore, using H<sub>2</sub> with HBr/CH<sub>4</sub> would be obvious to one skilled in the art at the time of the invention was made because it would provide a smooth etching or surface.

Appellants' arguments that one skilled in the art would be discouraged from using CH<sub>4</sub> and H<sub>2</sub> or combine Pearton with Fathimulla, and that Pearton teaches away from using CH<sub>4</sub>/H<sub>2</sub> because Pearton teaches the use of HI/H<sub>2</sub> having much faster etch rates than CH<sub>4</sub>/H<sub>2</sub> are found unpersuasive because this is not relevant to the claims since the claims do not have anything to do with the etch rates and Fathimulla further is more concerned about having a smooth etching surface (col. 3, line 65-68). With Pearton's teaching that H<sub>2</sub> is compatible with CH<sub>4</sub> and using H<sub>2</sub> would provide a smooth surface (page 839, 1<sup>st</sup> column, 2<sup>nd</sup> paragraph), one skilled in the art would find it obvious to add H<sub>2</sub> in order to achieve a smooth surface etching. Furthermore, appellants have not addressed the motivation to add H<sub>2</sub> is that using H<sub>2</sub> would provide a smooth surface as taught by Pearton above. One skilled in the art would not be discouraged from using a composition including CH<sub>4</sub>/H<sub>2</sub> because the combined etching

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composition would also include other gas such as HBr and the etch rates are controlled by adjusting other processing parameters such as bias power to achieve practice etch rates as taught by Pearton (page 8388, left column).

Referring to appellants' argument that Fathimulla cannot be combined with Pearton because Fathimulla teaches of using either HBr/CH<sub>4</sub> or HBr/ H<sub>2</sub> in alternative therefore he teaches away of using all three compounds together is found unpersuasive because again there is no such specific teaching of against using all 3 of these compounds by Fathimulla. That is teaching a way of etching semiconductor material using either of those compositions.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Duy-Vu N Deo/

Primary Examiner, Art Unit 1792

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/Nadine G Norton/

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QAS, TC1700